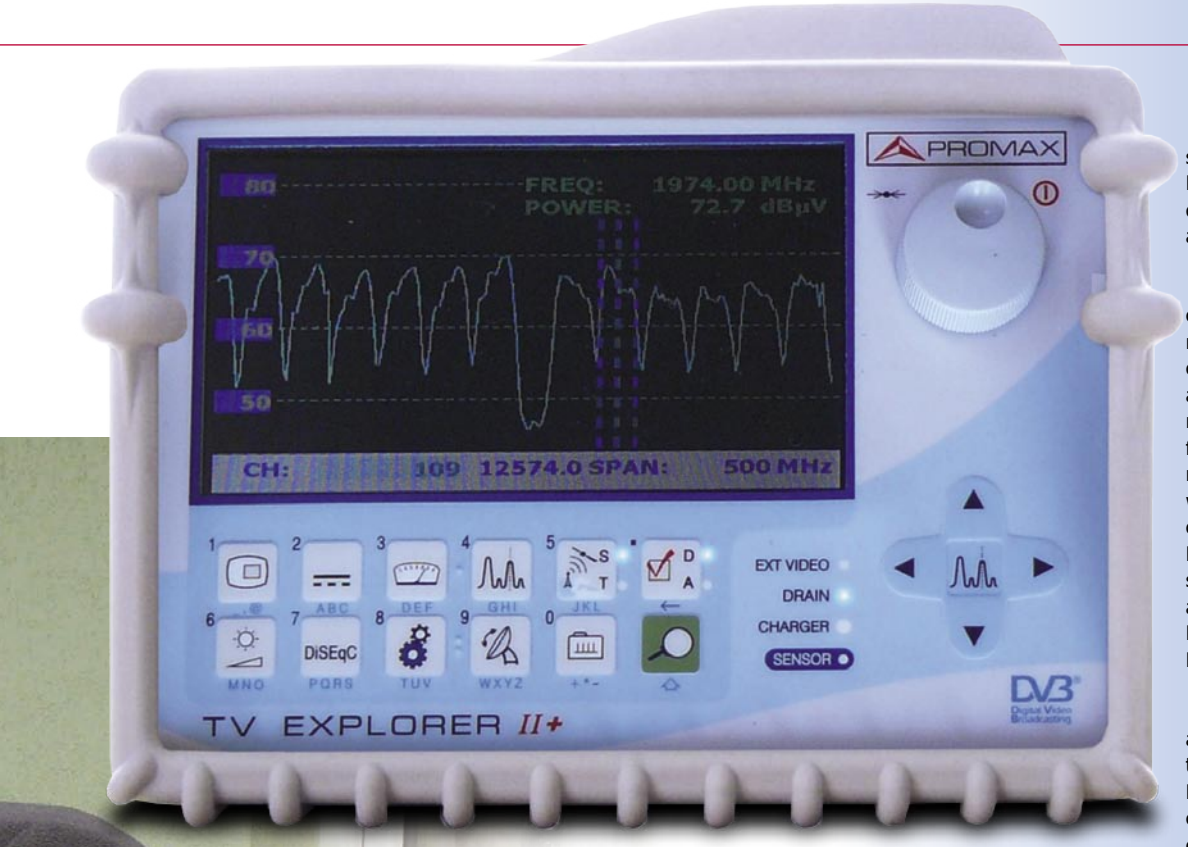
Promax TV Explorer II+

State of the Art Universal Signal Analyzer

TELE SATELLITE AWARD & BROADBAND 06-07/2008

PROMAX TV EXPLORER II+
Promax at its best! A must for satellite professionals; ergonomic and universally usable with sun-proof display



Some people can align their satellite dishes without any extra equipment. Sometimes, they even do it without a signal finder - using only a standard satellite receiver. Of course, this method takes much more time and the alignment may not be as perfect as it could be. Things are not as easy when the antenna is on the roof. In this case you should at least have a simple signal finder although this will not be good enough if you are planning to set up and maintain an SMATV network.

When you have to precisely align several satellite and terrestrial TV and radio antennas, then mix all the incoming signals and distribute them among many different apartments in a building, you need something much more sophisticated. That's where the TV Explorer II+ from Promax comes into play. This instrument is so versatile that it's difficult to find a proper name for it. Is it: a field strength meter, a spectrum analyzer, a satellite finder, a test receiver or a constellation diagram meter? Is it for analog or digital TV signals? Is it for satellite, cable or terrestrial transmissions? Is it for TV or radio signals? The TV Explorer II+ is all of these things and is more than capable of handling all of these measurements! We've decided to call it a universal signal analyzer because there is no better name for such a multifunctional instrument just yet.

Our regular readers may remember our test report on the Prolink-4C Premium. This meter also came from Promax. We were really impressed by its performance and versatility. Its successor, the TV Explorer II+, is much smaller and lighter but at the same time even more powerful and ergonomic. Sounds impossible? Believe us, it's true! In the TV Explorer II+, Promax added DVB-S2 signal analysis and a USB port. The menu structure has been redesigned and is now more intuitive and more dependent on the current measurement mode. When you measure one parameter, for example C/N, you can conveniently see all the other important parameters on the same screen: channel power, MER, CBER, VBER, L-band frequency, transponder frequency and channel number.

Let's highlight the features of the TV Explorer II+. It can measure TV and radio signals of all kinds: satellite, terrestrial and cable. It is suitable for FM radio, mobile TV (DVB-H) and for the return channel in cable networks. It works equally well with QPSK, 8PSK, QAM or COFDM modulation. The TV Explorer II+ is really a multistandard instrument. It accepts any TV system: PAL, SECAM or NTSC and any TV standard: M, N, B, G, I, D, K or L.

The TV Explorer II+ covers a frequency range that is continuous from 5 MHz to 2150 MHz. This covers all terrestrial, cable and satellite ranges. Of course, in the case of satellite transmissions, we are not referring to the downlink frequency from the satellite but rather the output frequency from the LNB (L-band). We can either tune the frequency continuously or jump from transponder to transponder. It comes preprogrammed with the transponders of many satellites and, of course, this data can be reprogrammed. It measures signals from 44/45 dBµV to 100/114 dBµV depending on the modulation type. The measured parameters, depending on modulation mode, include: power, BER, VBER, LBER, MER, C/N, noise margin and number of wrong packets.

Of course, the analyzer can measure both DVB-S and DVB-S2 signals. All the different FEC

Transport suitcase takes it all - the meter and all accessories

code rates are supported. For DVB-S2 this would be 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 and Auto for QPSK signals and 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 and Auto for 8PSK signals. If you also deal with analog signals, you'll be happy to know that you haven't been left in the dark with the TV Explorer II+. It can measure signal level, C/N, video-audio ratio, FM deviation and demodulation (the last two are for classical terrestrial/cable signals).

We can't emphasize enough the importance of the spectrum analyzer in this meter. Not only can you examine a signal without knowing any channel frequencies, but you can also detect all the unwanted signals that may be present in a network because of interference. The frequency span is selectable from 16 MHz to full band and the vertical range is adjustable in steps. Except for measurements, the meter can display the video of a TV signal regardless if it is analog or digital. For digital signals, you can view all free-to-air MPEG-2 channels. It is also possible to receive scrambled channels as long as the proper CAM with smartcard is inserted into the CI slot located on the rear panel of the meter. This is a really unique feature; not many other meters can say they have this. Please note that the meter can not process MPEG-4 streams. In order to view MPEG-4 FTA channels, a suitable MPEG-4 to MPEG-2 conversion module needs to be inserted. However, the meter can measure all DVB-S2 signals even if they carry MPEG-4 streams. The additional module is only required to see the video of a channel.

▲ Meter with accessories

Everyday Use

The meter was delivered from Promax in a very large package. We were surprised to discover that so many accessories were included. The box included a very practical carrying bag, a protective suitcase (both with the shoulder straps), an external power supply with a power cord, a car power adapter, a USB cable, a 10 dB signal attenuator, connector adapters and a USB memory stick with PC software to control the instrument and store the results.

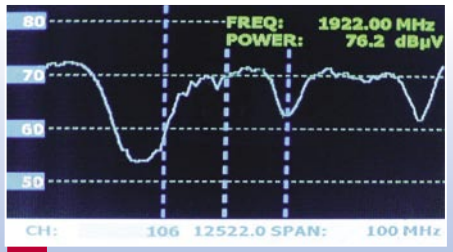
The largest component on the front panel is the 16:9 LCD display. Underneath there are twelve control buttons. From left to right in the top row the buttons show the video of the channel, set the power for the LNB, show measurement results, show the frequency spectrum, switch between satellite/terrestrial mode and switch between digital/analog mode. In the bottom row from the left the buttons access image and sound properties, DiSEqC commands, utilities/setup, antenna alignment mode, transponder or frequency tuning and transponder identification. If you had any doubts, yes, the TV Explorer II+ can send any DiSEqC command 1.0, 1.1 or 1.2. The identification of a satellite is based on the information transmitted from a transponder in the NIT table. If only this information is transmitted (and this depends on the configuration of the provider's headend), there should be an orbital position and network provider name. So, for example, the Explorer may show us: 13E, ABSat.

Four arrows are used in spectrum mode to conveniently set the frequency span and the reference level (moving the spectrum up or down). They can also be used when in the menu to travel among different items and options. The tuning knob is used for moving the marker when in spectrum mode, moving the highlight in the menu or changing the transponder/channel number. Lastly, there are three status LEDs and a luminosity sensor on the front panel. The LED's indicate that external video (supplied by the Scart connector) is playing on the screen, that an external device (LNB) is powered and that the battery is being charged. The sensor adjusts the brightness and contrast of the display and helps to conserve battery power. The battery can power the instrument for about 4.5 hours continuously. But only 3 hours are needed to charge it to 80%.

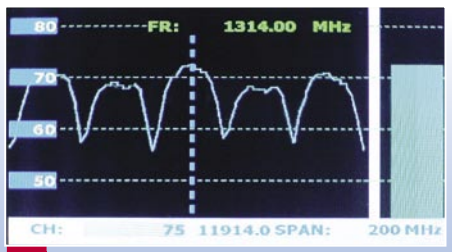
The F connector is situated on the top side panel. Included in the package are suitable connector adapters (F to BNC and F to DIN). The power supply socket is located on the right side panel; there's also a small hole used to reset the unit. We did not have to use the reset feature; the software functioned properly throughout the entire test. On the reverse side is the Scart connector. It can be used to send the LCD video and audio to an external monitor or TV set or it can accept an incoming video/audio signal for display on the LCD.

The rear panel sports the CI slot for use with a CA module plus there's also a USB port so that the meter can communicate with a PC. The whole case is enclosed in protective grey rubber to help protect the meter should it bump into a satellite mast or some other hard surface.

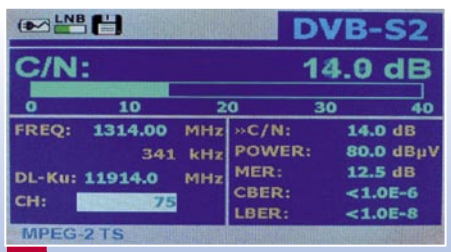
As we mentioned before,



Spectrum analyzer



Antenna alignment



Carrier to Noise ratio measurement

we've already had some experience with the excellent Prolink-4C Premium meter. Because of this, we didn't really expect too many surprises with the TV Explorer II+. But we were wrong! It not only includes all the functions of its older brother, but comes with a few more. We mentioned the DVB-S2 measurements, but there are also the I-Q constellation diagrams for DVB-T/H, DVB-C, DVB-S and DVB-S2 and special test functions for measuring distribution networks with the help of RP-250 and RP-080 signal simulators.

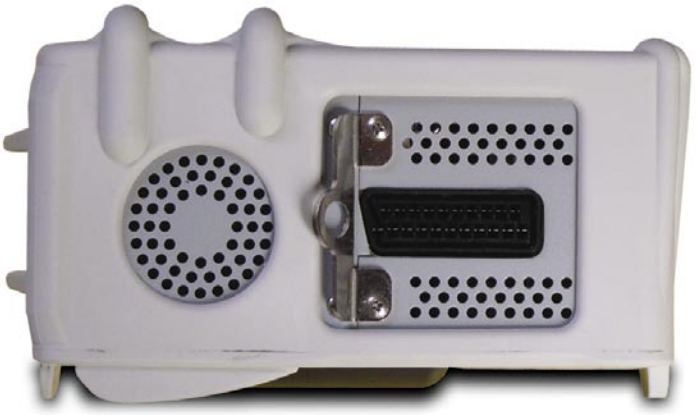
However, the most striking difference between these two meters except other than the size and weight is the ease of use. While the Prolink-4C Premium was quite ergonomic, the TV Explorer II+ could probably be used as a reference design for all other similar instruments. We found the operation of all of its controls to be intuitive. In order to see the selected polarization and sub band in many other instruments, you have to enter the L-Band frequency and set the LNB voltage and 22 kHz signal presence. The TV Explorer II+ allows you to jump from transponder to transponder ordered by frequency while automatically setting the proper voltage and 22 kHz signal. Of course, this is possible since the transponder lists are stored in the meter's memory.

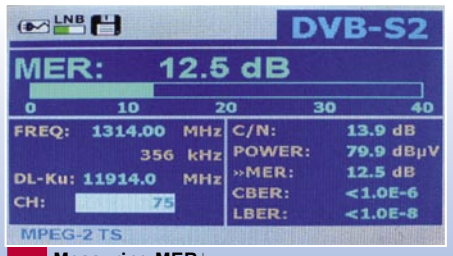
Despite the exceptional internal complexity of the instrument and its wealth of features and functions, we only had to refer to the user manual occasionally. Naturally, if you want to take full advantage of all of its features, it would be a good idea to read the user manual from cover to cover. It has 85 pages full of pictures and is written in Spanish, English and French. Its content is easy to follow thanks to its logical layout; it is easy to quickly find the information you need. There's also a Quick Reference Guide for those who want to get started right away.

We used the TV Explorer II+ for the most obvious task – aligning a dish. Its large display, fast response and good measurement resolution make this a simple task. First, we switched to the antenna alignment mode. The display showed the spectrum with a high sweep rate and two vertical bars on the right side. The left bar showed the maximum value that was recorded within the last few seconds while the right one showed the current level. This is somewhat similar to the volume level meters found in good quality audio equipment. Additionally, there is an audible signal with a pitch that rises when the signal level goes up.

After arbitrarily setting the elevation of the antenna, we moved it steadily from left to right and back again trying to locate some spikes on the spectrum analyzer graph and peaks on the bars. This proved to be unsuccessful so we changed the elevation and repeated the left-right movement. Once we observed a signal presence, we stopped. Next we wanted to find a maximum level. By delicately pushing and pulling the top, bottom, left and right edges of the dish, we discovered how much of a fine adjustment was still needed. After correcting azimuth and elevation we achieved an almost maximum signal level reading.

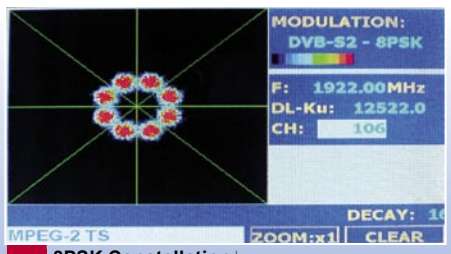
But what was the satellite we had just aligned to? To find out we switched to normal spectrum and adjusted the marker to one of the digital transponders. Digital transponders are more "squared" in that they have flat tops. Analog transponders have more of a bell shape. We had two possibilities. Because we had preset the channel frequency plan to the desired satellite (Astra 19.2° E) and switched the tuning to transponder zapping mode, we could use the tuning knob and see if the marker is jumping from the center of one transponder to the center of the next transponder. Unfortunately, the





Measuring MER

QPSK Constellation



8PSK Constellation

marker did not jump to the centers of the transponders so we switched to continuous tuning (smooth frequency changing) and moved the marker to the center of a digital transponder. After pushing the satellite identification button, we discovered the dish was pointing to 13° E. As it turns out, we managed to find the Hotbird satellite instead of Astra.

Because our goal was to align the dish to Astra 19.2° E, we knew that we needed to move the antenna to the east. We started moving and after a moment noticed another peak in the signal level. It must have been Eutelsat W2 16° E. We continued moving and arrived at a stronger signal a bit further to the east. After switching to transponder zapping mode, we could see that the marker was now always in the middle of the transponder spectra. We confirmed that it was Astra by identifying the satellite again. This time we switched to channel watching mode. In 2 - 3 seconds we were watching the channel video. We played for a while tuning between transponders and channels within a transponder. Everything was working; we were watching the Astra 1 satellite at 19.2° E.

But we were not finished yet. Next we wanted to precisely adjust azimuth, elevation and LNB position in the holder (skew). To do that, we switched to C/N measurement mode. We adjusted all three settings in small steps to get a maximum reading. This can also be done using MER measurement mode. If you prefer to tune for minimum rather than maximum, you can use CBER mode. VBER is not that useful for alignment because of its very sharp reaction.

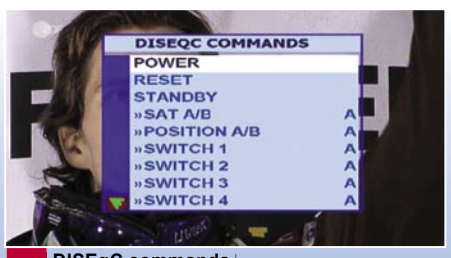
We especially liked the C/N readings when adjusting the skew of the LNB in its holder. Even a slight turn was immediately noticeable by a change in the C/N thanks to its high measurement resolution of 0.1 dB. The perfect antenna alignment; it doesn't get easier than this. Thanks to its large display, you can even put the TV Explorer II+ on the floor/ground and still be able to see the results and perform an antenna adjustment. The reason is that the display is made in transflective TFT technology. Thanks to this the display brightness is really high and it is easy readable even outdoors. Actually, the Explorer II+ is the only meter on market using this highly user-friendly technology.

The meter also worked well in more complex antenna systems that involved DiSEqC switches and motors. However, for efficient operation, the user must be familiar with DiSEqC commands (which command does what). After tuning to the satellite signal in spectrum analyzer mode, only one button push was needed in order to watch the video of the first channel in the multiplex. We could also switch to all the other channels in the multiplex and at the same time get information on the video/audio PID's and the actual resolution and bit rate.

We also tested the meter with analog cable TV cable signals and managed to do that without any problems.

TV Channel analysis

Showing channel video



DISEqC commands

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Expert Opinion

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The TV Explorer II+ is an amazingly versatile and ergonomic instrument for a professional installer. It is excellent for setting up and maintaining satellite/terrestrial antennas and their signal distribution networks. The instrument is also a full featured tool for examining analog or digital cable networks connected to headends. It can even be used to check FM radio or DVB-H signals! It's TFT display is readable also in bright sunlight.

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TELE-satellite
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None

TECHNIC DATA

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Tel	+34-932-602-000
Website	www.promax.es
Email	promax@promax.es
Model	Promax TV Explorer II+
Function	Universal Satellite Signal Meter and Analyzer
Type of signals processed	Analog TV terrestrial/cable and satellite, DVB-S, DVB-S2, DVB-C, DVB-T, DVB-H, FM Radio
TV systems	PAL, SECAM, NTSC
TV standards	M, N, B, G, I, D, K and L
Tuning range	5 to 1000 MHz (terrestrial) and 950 to 2150 MHz (satellite)
Measured parameters for DVB-S (QPSK)	Power, CBER, VBER, MER, C/N and Noise Margin
Measured parameters for DVB-S2 (QPSK/8PSK)	Power, CBER, LBER, MER, C/N and Wrong Packets
Constellation diagram available for:	DVB-T/H, DVB-C, DVB-S, DVB-S2
DVB-S signal range	44 dBµV to 114 dBµV, 2 to 45 Ms/sec
DVB-S2 signal range	44 dBµV to 114 dBµV, 2 to 33 Ms/sec (QPSK) and 2 to 30 Ms/sec (8PSK)
Spectrum Analyzer (satellite range)	Input: 30 dBµV to 130 dBµV Span: Full – 500 – 200 – 100 – 50 – 32 – 16 MHz selectable
Monitor	transflective TFT 6.5 "
Aspect ratio	16:9, 4:3, Auto
External units powers supply (e.g. LNB)	5/13/15/18/24 V, 22 kHz: 0.65 ± 0.25 V
Internal power supply	7.2V 11 Ah Li-ion Battery 4.5 hours of continuous operation
Recharging time	3 hours to 80%
External power supply	12 V, 30 W
Operating temperature	5 to 40° C
Humidity	80% (up to 31° C) decreasing linearly to 50% at 40° C
Dimensions	230 x 161 x 76 mm
Weight	2.2 kg

What do all these acronyms mean?

QPSK *— phase modulation used in DVB-S and DVB-S2 transmissions. 4 phase angles are used.*

8PSK *— phase modulation used in DVB-S2 transmissions. 8 phase angles are used. If used instead of QPSK, more data can be sent in the same bandwidth.*

QAM *— phase/amplitude modulation used in DVB-C transmission. Different number of phase angles and amplitude levels are used depending on the mode: 16QAM, 32QAM, 64QAM, 128QAM or 256QAM.*

COFDM *— complex modulation used in DVB-T optimized to be insensitive to the interference typical for terrestrial TV.*

L-Band *— frequency range 950-2150 MHz to which all satellite signals are converted to by an LNB (Ku-, C- or S-band). This frequency range is used to transmit satellite signals via a cable from an LNB to a satellite meter and/or satellite receiver.*

MPEG-2 *— the older compression method used for digital video in DVB. Still widely used for standard definition channels.*

MPEG-4 *— the newer more efficient compression method for digital video in DVB-S2 and DVB-T/H.*

C/N *— carrier-to-noise ratio expressed in dB. One of the basic terms used to assess signal quality. The higher the C/N, the better the signal. In practice, it is difficult to measure it correctly because it is not possible to switch the transponder off and measure only the noise. The meter tries to find a noise level next to the transponder signal and uses it as a reference. The readings may be too pessimistic.*

BER *— bit error rate: a measure of digital signal quality telling us how often we have a false bit in an incoming data stream. Thus, $3x10^{-4}$ means that in 10,000 bits we have 3 false bits (0's instead of 1's or vice versa). The lower the BER the better. For example, $4x10^{-5}$ is better than $1x10^{-4}$.*

CBER *— channel BER. Bit error rate before the forward error correction technique is used.*

VBER *— Viterbi BER. Bit error rate after the Viterbi forward error correction technique has been applied. VBER is always much better (lower) than CBER. Signals with a VBER = $1x10^{-4}$ are regarded as Quasi Error Free (QEF). It is marked on the bar indicator scale when the TV Explorer II+ is in VBER measuring mode.*

LBER *— BER after Low Density Parity Check. This is an equivalent of VBER for DVB-S2 signals.*

MER *— modulation error ratio. The relation between the average power of a DVB signal and the average power of noise present in the constellation of a signal. It is "a digital equivalent of signal-to-noise" ratio in analog transmissions. So, the higher the MER the better (like C/N). The TV Explorer II+ also shows the noise margin (in dB) when in MER measurement mode. We should have at least a 3 dB noise margin to ensure good reception even in bad weather conditions.*